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EXAMINER	
BLAN, NICOLE R	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/501,155	SAGA, KOICHIRO	
	Examiner	Art Unit	
	NICOLE BLAN	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *54-74* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *54-74* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 1, 2008 has been entered. Claims 1-53 are cancelled and claims 54-74 are new.

Response to Arguments

2. Applicant's arguments filed December 1, 2008 have been fully considered but they are not persuasive.

In response to applicant's arguments regarding Mullee - 6,277,753, the Examiner believes that the applicant meant to refer to Mullee - 6,306,564 in their discussion based on the text from the specification cited in their remarks. The Examiner will address it as such. The Examiner respectfully disagrees with applicant's statement that Mullee '564 fails to teach a liquid form of said supercritical substance being absent from within the chamber. Mullee '564 clearly states that the pressure vessel is flushed with supercritical CO_2 and/or liquid CO_2 which means that the vessel is flushed with supercritical CO_2, or liquid CO_2, or both supercritical CO_2 and liquid CO_2. Therefore, it is taught that only supercritical CO_2 is present within the system. Thus, Mullee '564 still reads on the claimed limitations. Please see the detailed rejection below.

In response to applicant's argument regarding Vaartstra, the Examiner does not find this persuasive. '165 clearly teaches maintaining the temperature and pressure at the appropriate

amount to ensure supercritical CO_2 exists in order to remove contaminants on the surface of the structure [col. 7, lines 54-64; col. 8, lines 3-11; col. 9, lines 38-43]. Thus, Vaartstra still reads on the claimed limitations. Please see the detailed rejection below.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 54-74 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is what is actually required by the surface treatment (e.g. cleaning) and what is being cleaned. There is disclosure for the items listed in claims 69-72, but there is not support for surface treatment of all objects in the specification.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 54-56, 58, 59, 67 and 74 are rejected under 35 U.S.C. 102(e) as being anticipated by Vaartstra (U.S. Patent 6,242,165, hereinafter '165).

Claims 54 and 67: '165 teaches a method for treating a surface (of a semiconductor, etc.) with a supercritical fluid, such as supercritical CO_2 that is combined with a co-solvent, such as ammonium hydroxide [abstract; col. 4, lines 29-57; col. 5, lines 14-19 and lines 38-67; col. 6, lines 11-56; col. 7, lines 54-64].

Regarding the limitation "wherein a liquid form of said supercritical substance is absent from within said treatment chamber," '165 clearly teaches maintaining the temperature and pressure at the appropriate amount to ensure supercritical CO_2 exists in order to remove contaminants on the surface of the structure [col. 7, lines 54-64; col. 8, lines 3-11; col. 9, lines 38-43].

Claims 55, 56, 58 and 59: '165 teaches the limitations of claim 54 above. '165 also teaches that the supercritical CO_2 can be combined with ammonia [reads on "co-solvent or reactant is said ammonium hydroxide" in claims 55 and 56; col. 5, lines 49-64] or ammonium fluoride [reads on "co-solvent or reactant is said amine fluoride" in claims 55 and 58] or hydrofluoric acid [reads on "co-solvent or reactant is said hydrofluoric acid" in claims 55 and 59].

Claim 74: '165 teaches the limitations of claim 54 above. '165 also teaches that a semiconductor device can be obtained after the surface treatment [col. 4, lines 30-57].

7. Claims 54, 55, 57, 58, 62, 63, 66, 67 and 74 are rejected under 35 U.S.C. 102(e) as being anticipated by Mullee et al. (U.S. Patent 6,306,564, hereinafter '564).

8. Claims 54, 55, 57, 58 and 67: '564 teaches a method for treating a surface (a semiconductor, etc.) with a supercritical fluid, such as supercritical CO_2 that is combined with a co-solvent, such as diglycolamine or ammonium fluoride [col. 2, lines 29-49; col. 4, lines 12-36; col. 5, claim 1].

Regarding the limitation "wherein a liquid form of said supercritical substance is absent from within said treatment chamber," '564 teaches the pressure vessel contains supercritical CO_2 for cleaning as well as flushes the pressure vessel with supercritical CO_2 *only* [col. 5, lines 4-7].

Claims 62 and 63: '564 teaches the limitations of claim 54 above. '564 also teaches using a supercritical fluid to treat a surface as well as adding a polar surfactant material, such as isopropanol to the supercritical fluid [col. 4, lines 12-35].

Claim 66: '564 teaches the limitations of claim 64 above. '564 implicitly teaches terminating a supply of a co-solvent/reagent and a supply of a surfactant because it teaches flushing the pressure vessel with supercritical CO_2 to remove all traces of remaining chemicals [col. 5, lines 4-7].

Claim 73: '564 teaches the limitations of claim 54 above. '564 also teaches depressurizing the pressure vessel before the system is vented to the atmosphere [reads on "converting supercritical substance into a gas form"; col. 5, lines 7-9].

Claim 74: '564 teaches the limitations of claim 54 above. '564 also teaches that a semiconductor device can be obtained after the surface treatment [col. 1, lines 9-14; col. 2, lines 29-49].

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 68, 69, 71 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra (U.S. Patent 6,242,165, hereinafter '165).

Claim 68: '165 teaches the limitations of claim 67 above. '165 teaches that in order to have carbon dioxide enter the supercritical state it must be at a temperature above 31°C and a pressure above 7.38 MPa [col. 4, lines 5-65]. '165 also teaches that the temperature and pressure of the supercritical fluid mixture is result effective [col. 5, lines 60-67; col. 6, lines 23-45]. In the absence of unexpected results, it would have been obvious to a person having ordinary skill

in the art at the time the invention was made to determine the appropriate temperature and pressure of the supercritical fluid and its co-solvents, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 69: '165 teaches the limitations of claim 54 above. '165 teaches a method of treating a surface (of a semiconductor, etc.) by removing contaminants from the surface; therefore, it is implicitly taught that the contaminants removed from the surface are discharged so that they do not settle on the surface again or contaminant future surfaces. '165 discloses venting the composition from the process chamber [col. 9, lines 51-57].

Claims 71 and 72: '165 teaches the limitations of claim 69 above. '165 also teaches where the surface has a structural body and is a fine structural body with an electrode pattern [col. 4, lines 30-57].

12. Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra (U.S. Patent 6,242,165, hereinafter '165) in view of Mullee et al. (U.S. Patent 6,277,753, hereinafter '753).

Claims 60 and 61: '165 teaches the limitations of claim 54 above. '165 teaches that in order to have carbon dioxide enter the supercritical state it must be at a temperature above 31°C and a pressure above 7.38 MPa [col. 4, lines 5-65]. '165 also teaches that the temperature, pressure as well as the tailoring of additional components (concentration of co-

solvents/reactants) of the supercritical fluid mixture is result effective [col. 5, lines 60-67; col. 6, lines 23-45]. It does not teach the specific values for temperature, pressure or the concentration range of ammonium hydroxide. However, '753 teaches cleaning a surface of a substrate with supercritical CO_2 and ammonium hydroxide at a pressure range from 1050-6000 psi, a temperature range from 20-70°C and a concentration of ammonium hydroxide from 0.1-15 v/v% [col. 2, lines 50-67; col. 3, lines 1-10]. In the absence of unexpected results, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to determine the appropriate temperature and pressure of the supercritical fluid and the concentration of its co-solvents, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

13. Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra (U.S. Patent 6,242,165, hereinafter '165) in view of Mullee et al. (U.S. Patent 6,306,564, hereinafter '564).

Claim 70: '165 teaches the limitations of claim 69 above. It does not teach that the surface is a photomask utilized for lithography. However, '564 teaches using a supercritical fluid to treat the surface of photoresist used in a photolithographic process [col. 2, lines 29-49]. That is, the method to treat a surface taught in '165 could be used to treat a surface of photoresist used in a photolithographic process as taught in '564. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the method taught in '165 to treat a surface of photoresist used in a photolithographic process as taught in '564. Using the known

technique of treating a surface with supercritical fluid and NH_3 of '165 would have been obvious to one of ordinary skill in the art.

14. Claims 64, 65 and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (U.S. Patent 6,306,564, hereinafter '564).

Claims 64 and 65: '564 teaches the limitations of claim 62 above. '564 teaches a treating a surface (a semiconductor) with a supercritical CO_2, diglycolamine (reagent) and IPA (surfactant) [col. 2, lines 29-49; col. 4, lines 12-36; col. 5, claim 1] and teaches and the temperature is between 20-80°C, pressure is between 1050-6000 psi, and concentration of the additives are less than 15% volume [col. 4, lines 12-36; col. 6, claims 3, 5 and 8]. In the absence of unexpected results, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to determine the appropriate temperature, pressure and concentration of the supercritical fluid and the additives, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 68: '564 teaches the limitations of claim 67 above. '564 also teaches and the temperature is between 20-80°C and the pressure is between 1050-6000 psi [col. 6; claims 3 and 5]. A *prima facie* case of obviousness exists because the claimed ranges overlap the ranges disclosed by the prior art. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. B./
Examiner, Art Unit 1792

/Alexander Markoff/
Primary Examiner, Art Unit 1792